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| 09/912,278 | 07/24/2001 | Amir Said | 1006298-1 | 5635 |

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| EXAMINER | |
|---|---|
| LAROSE, COLIN M | |

| ART UNIT | PAPER NUMBER |
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| 2623 | |

DATE MAILED: 07/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. 09/912,278 | Applicant(s) SAID, AMIR | |
|---|---|---|---|
| | Examiner Colin M. LaRose | Art Unit 2623 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-20 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-8,11-16,19 and 20 is/are rejected.

7)☒ Claim(s) 9,10,17 and 18 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 2,3.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

## DETAILED ACTION

### *Claim Objections*

1. Claims 9, 10, 17, and 18 are objected to because of the following informalities:

In claims 9 and 17, the variables utilized in the equations should be defined for clarification. Appropriate correction is required.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1, 11, and 19 are rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent 6,329,819 by Manduca et al. ("Manduca").

Regarding claim 1, Manduca discloses a method for detecting an edge in a digital image block, the method comprising determining an entropy of pixel (luminance) differences in the block (column 5, line 43 through column 6, line 10: equation 2 computes the entropy of pixel gradients for an image block, with the entropy indicating the presence and lucidity of edges within the block).

Regarding claims 11 and 19, Manduca discloses the apparatus and article for the corresponding method of claim 1 (see figure 1).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 2 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manduca in view of U.S. Patent 5,271,064 by Dhawan et al. ("Dhawan").

Regarding claims 2 and 12, Manduca is silent to creating an histogram of the pixel luminance differences, and then computing the entropy from the histogram.

Dhawan discloses a system for smoothing regions and enhancing edges in gray scale images. In particular, Dhawan discloses computing the entropy of a local area, and then using the entropy calculation to determine when to terminate enhancement. As shown in figure 8, local contrast vectors (i.e. gradients) are compiled into a contrast histogram, and then the entropy of the local area is calculated using the contrast histogram.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Manduca by Dhawan to achieve the claimed invention since Dhawan shows that computing the entropy of a local area is conventionally realized by creating an histogram of gradients and then computing the entropy from the histogram.

6. Claims 5-8 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manduca in view of U.S. Patent 5,377,018 by Rafferty.

Regarding claims 5 and 20, Manduca is silent to determining the maximum pixel difference in the block (and using the maximum difference to determine whether the block contains an edge).

Rafferty discloses an image processing system that employs a routine to determine whether an edge is present in an image block (figure 6A). In particular, Rafferty discloses computing a maximum pixel difference in the block (70) in order to determine whether the block contains an edge (74,76).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Manduca by Rafferty to determine the maximum pixel difference (and to use the maximum difference to determine whether the block has an edge), as claimed, since Manduca is concerned with ascertaining the quality of edges within image blocks (column 5, lines 48-65), Rafferty shows that the actual presence of edges within a block is determined by comparing the maximum pixel difference to a threshold (figure 6A), and the maximum pixel difference denotes how much variation, or entropy, is present in the block (column 3, lines 15-24).

Regarding claim 6, Rafferty discloses comparing the maximum pixel difference to a threshold to determine whether the block contains an edge (70, figure 6A), and Manduca discloses comparing the entropy to a tolerance level to determine whether the edge is present and is of suitable quality.

Regarding claim 7, Rafferty teaches that a high maximum difference corresponds to a block with edges (70 and 76, figure 6A), and Manduca teaches that sharp edges are characterized by low entropy (column 5, lines 50-59).

Regarding claim 8, Rafferty teaches that a block is identified as not having an edge if the maximum difference is zero (according to blocks 70-76, figure 6A, the maximum difference must be at least greater than zero for the block to contain an edge).

7. Claims 14-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manduca in view of Dhawan, as applied to claim 12 above, and further in view of Rafferty.

Regarding claims 14, Manduca is silent to determining the maximum pixel difference in the block (and using the maximum difference to determine whether the block contains an edge).

Rafferty discloses an image processing system that employs a routine to determine whether an edge is present in an image block (figure 6A). In particular, Rafferty discloses computing a maximum pixel difference in the block (70) in order to determine whether the block contains an edge (74,76).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Manduca and Dhawan by Rafferty to determine the maximum pixel difference (and to use the maximum difference to determine whether the block has an edge), as claimed, since Manduca is concerned with ascertaining the quality of edges within image blocks (column 5, lines 48-65), Rafferty shows that the actual presence of edges within a block is determined by comparing the maximum pixel difference to a threshold (figure 6A), and the maximum pixel difference denotes how much variation, or entropy, is present in the block (column 3, lines 15-24).

Regarding claim 15, Rafferty discloses comparing the maximum pixel difference to a threshold to determine whether the block contains an edge (70, figure 6A), and Manduca

discloses comparing the entropy to a tolerance level to determine whether the edge is present and is of suitable quality.

Regarding claim 16, Rafferty teaches that a high maximum difference corresponds to a block with edges (70 and 76, figure 6A), and Manduca teaches that sharp edges are characterized by low entropy (column 5, lines 50-59).

8. Claims 3 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manduca in view of Dhawan as applied to claims 2 and 12 above, and further in view of U.S. Patent 5,481,620 by Vaidyanathan.

Regarding claims 3 and 13, Manduca and Dhawan are silent to utilizing a look-up table to store the entropy of the histogram, as claimed.

Vaidyanathan discloses an image processing system wherein entropy values of an histogram are calculated (B, figure 2), and then the entropy values are stored in a look-up table (C, figure 2). Vaidyanathan teaches that storing the values in a look-up table allows a simple look-up operation to be performed in lieu of subsequent re-calculations (column 6, lines 61-65).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Manduca and Dhawan by Vaidyanathan to achieve the claimed invention by pre-computing the bin entropies of the histogram for storage in a look-up table and then utilizing the look-up table to determine the entropy of the histogram, as claimed, since Vaidyanathan teaches that storing the pre-computed entropy values in a look-up table negates the need to re-calculate the entropy values for each bin and allows for easy access of the entropy values.

9. Claims 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Manduca in view of Dhawan and Vaidyanathan as applied to claim3 above, and further in view of U.S. Patent 5,594,807 by Liu.

Regarding claim 4, Vaidyanathan is silent to scaling or rounding the numbers in the look-up table to integers. Liu discloses truncating or rounding numbers to be stored in a look-up table to integers, since it eases pre-computation and storage of the values (column 12, lines 1-5). At the time the invention was made, rounding numbers to be stored would have been an obvious expedient for the purposes of reducing the size of the table to be stored.

### *Allowable Subject Matter*

10. Claims 9, 10, 17, and 18 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims, and if rewritten to overcome the above claim objections.

### *Conclusion*

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 5,115,477 by Groezinger

U.S. Patent 5,150,433 by Daly

U.S. Patent 6,356,651 by Murakami (column 17, lines 24-45)

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colin M. LaRose whose telephone number is (703) 306-3489.

The examiner can normally be reached Monday through Thursday from 8:00 to 5:30. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amelia Au, can be reached on (703) 308-6604. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the TC 2600 Customer Service Office whose telephone number is (703) 306-0377.

CML
Group Art Unit 2623
10 July 2004

AMELIA M. AU
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600